Feb. 7, 1956 W. M. ELIOT 2,733,819

CAR PARKING SYSTEM AND STRUCTURE

Original Filed June 18, 1948 2 Sheets-Sheet 1

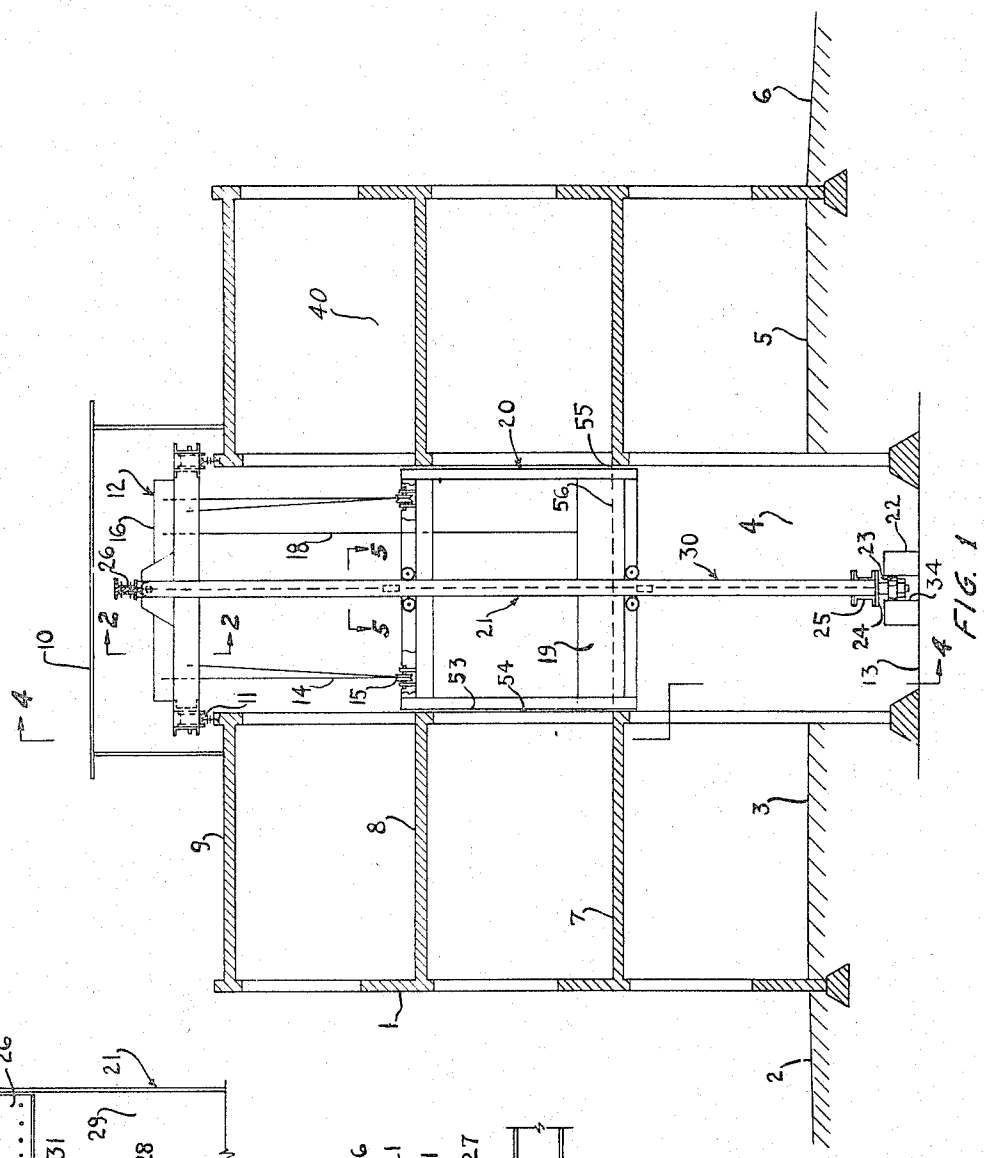


FIG. 1

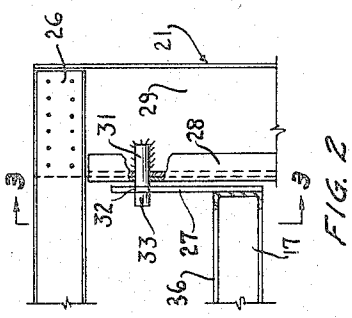


FIG. 2

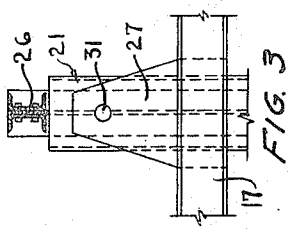


FIG. 3

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CAR PARKING SYSTEM AND STRUCTURE

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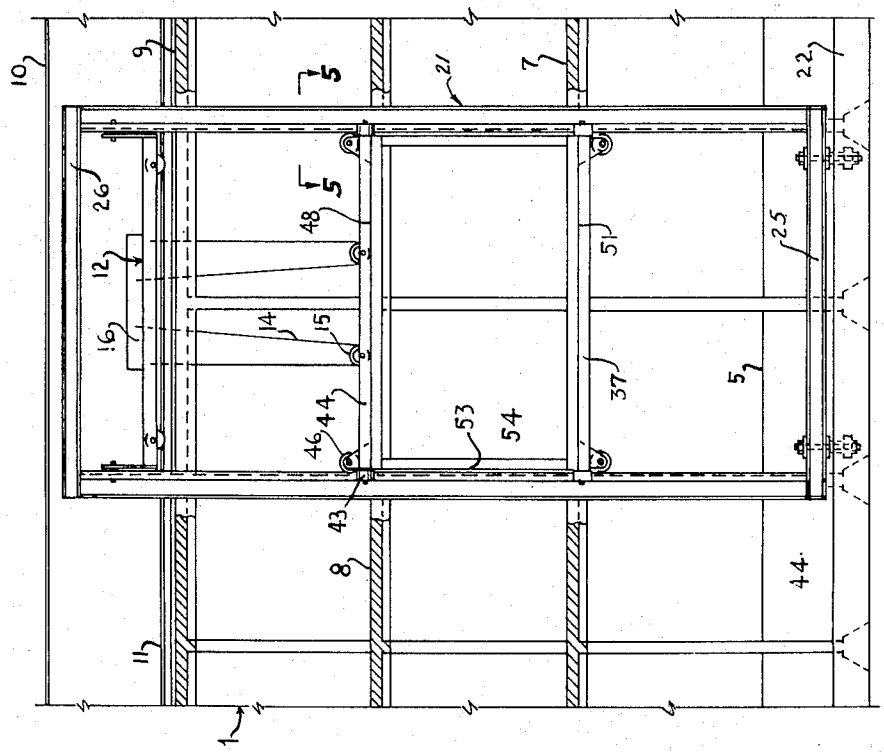


FIG. 4

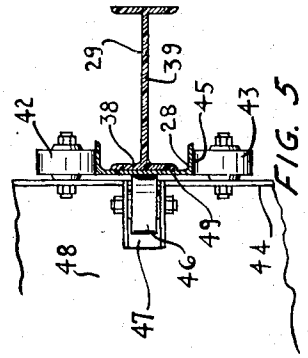


FIG. 5

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CAR PARKING SYSTEM AND STRUCTURE

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Original application June 18, 1948, Serial No. 33,903, now Patent No. 2,663,435, dated December 22, 1953. Divided and this application March 16, 1953, Serial No. 342,671

2 Claims. (Cl. 214—16.1)

This application is a divisional application of my copending application for car parking system and structure, now Patent No. 2,663,435, granted December 22, 1953, the invention herein disclosed relating to a multi-storied parking structure and to a system of parking loads therein, especially mobile loads such as automobiles and trucks.

It is an object of this invention to provide a parking structure of this class in which a traction means supported by the structure has an elevator suspended therefrom so that the traction means may move the elevator and the loads therein horizontally, and so that the elevator may move the loads vertically into alignment with the desired story floor.

It is a further object of this invention to provide a structure of this class in which elevator guides are supported from the traction means and are transported thereby.

It is another object of this invention to provide such structure with a way extending substantially parallel with the direction of traction and engageable by the elevator guides for the purpose of holding the elevator in alignment with the traction means and with the elevator aisle axis.

It is a further object of this invention to provide a structure of this class in which the elevator and elevator guides are pivotally suspended from a traction means to provide compensation for any misalignment between the axis of the way and the traction means and its supports.

It is yet another object of this invention to provide a structure of this class in which the elevator has either slidable or rolling means thereon for maintaining contact with the elevator guides.

It is also an object of this invention to provide a structure of this class in which the elevator guides have either slidable or rolling means thereon for maintaining contact with the way.

It is also an object of this invention to provide structures of this class which may have aisles therein in which elevator and elevator guides are suspended for transportation therealong and for vertical motion therein to provide access of elevator loads to the load storage spaces of every floor.

It is a further object of this invention to provide structures of this class in which elevator floors may be brought into alignment with the story floors within such limits that the elevators do not bind the aisle sides and so that there is a minimum interspace left between floors to permit easy passage of loads thereover.

Other and further objects of this invention will be obvious when the specification is considered in connection with the drawings, in which:

Fig. 1 is a sectional elevation taken transversely of a parking structure;

Fig. 2 is a longitudinal sectional fragmentary elevation taken along line 2—2 of Fig. 1;

Fig. 3 is a transverse sectional elevation taken along line 3—3 of Fig. 2;

Fig. 4 is a longitudinal sectional elevation taken along line 4—4 of Fig. 1;

Fig. 5 is a fragmentary sectional plan taken along line 5—5 of Fig. 4.

In this invention a building structure 1 is shown having an entrance driveway 2 which leads to a car or load-receiving area 3 which terminates in an aisle 4, on the other side of which is a car or load-delivery area 5 which communicates with the exit driveway 6 on the exterior of the structure.

In the form of this invention disclosed, the aisle 4 terminates below the first floor level in an aisle floor 13. The structure may have any number of intermediate floors 7, one being shown in Fig. 1, and a top floor 8, above which is the roof 9, which supports a cupola 10. Beams 11 are located on the roof 9 adjacent the aisles to provide tracks for a transmission means such as a bridge crane 12.

The means for operating the elevator 20 and bridge crane 12 are not shown but these elements would logically be mounted on the bridge crane 12, behind the guard 16, and supplied from a source of electric power in the conventional manner.

The elevator 20 is shown suspended from the bridge crane 12 by suspension lines 14 which are reeved through pulleys 15 mounted on the elevator top 48 for actuation by the elevator operating means beneath the guard 16. The elevator control is not shown, but would be located behind the elevator side plate 19, and the electric control line 18 is shown extending therefrom up to the bridge crane 12 to actuate the elevator operating means.

In order to maintain the elevator in alignment as the bridge crane 12 carries it down the aisle 4, elevator guides 21 are provided for pivoted suspension from the crane, and these guides extend to substantially the bottom of the aisle 4. A track or way 22 is provided on the aisle floor 13, and such way is adapted to receive rollers 23 which extend from the bottom plate 24 of the guides 21 and are supported for rotation from this plate.

The guides 21 on either side of the elevator are tied together at the bottom by channels 25 and at the top by channels 26. This construction of guides and cross-channels results in a yoke unit 30. When this yoke 30 is pivotally, rather than rigidly, suspended from the bridge crane 12, a flexibility is obtained which permits compensation for any misalignment which may occur between the bridge crane axis of motion and its supporting track 11 and the way 22 in the aisle floor 13.

Any operative means may be employed to permit the yoke 30 to pivot transversely of the longitudinal axis of the way 22 and the bridge crane 12, and two forms by which this may be accomplished are disclosed in the drawings.

A gusset or pin plate 27 may be welded to both sides of the bridge crane base 17, as shown in Fig. 2. Holes are then drilled into the channels 28 and I-beams 29, which form the guides, and then pins 31 are welded in these holes. The pin ends 33 are then inserted in holes 32 in the pin plates 27, and the channels 25 and 26 are then bolted to the guides to complete the assembly of yoke 30 with the bridge crane 12. The pins 31 may be welded to the plates 27 and journalled in the guides 21 to accomplish the same functions.

A second construction, not shown, may consist of drilled pin plates on both guides 21 and bridge crane base 17 which constitute the journal members into which pins may be inserted to pivotally connect yoke 30 and bridge crane base 17.

With any of these constructions, in case the track beam 11 or the way 22 become warped or shifted in position, the pivotability of the yoke 30 about the bridge crane 12 compensates therefor so that the crane continues to ride

the track beams 11 without binding against either side of the track or without tending to jump off of the track.

Compensation is also provided for any vertical warpage of the track beams 11 resulting in portions thereof being higher than other portions, since the rollers 23 may slide along the inner faces 34 of the way 22 at different elevations.

The channel 28 and the inner I-beam flange 38 are shown cut away just below channels 26 so that only the I-beam web 39 extends between the channels 26 and is bolted thereto. In turn, the channels 26 are shown extending just short of the outer I-beam flange 41.

The contact between the elevator 20 and the elevator guides 21 may be maintained by any slidable engagement therebetween. In the form disclosed in Fig. 5, rollers 42 and 43 are mounted in the top rim 44 and bottom rim 37 of the elevator 20 to contact the flanges 45 of channel 28. Also, rollers 46 are mounted for rotation on the brackets 47, which are fixed to the elevator top 48 and bottom 51 to position the roller 46 in rolling contact with the back 49 of the channel 28.

The structure of this invention is especially adapted for employment in the center of cities where only a limited street frontage may be available as the entrance for cars which are to be parked in garage space extending longitudinally and parallel with the street and behind business buildings which front on the street. In such cases the cars may drive into the load receiving area 3, which is the width of the narrow street entrance 2, not shown, and from this point the cars are driven on to the elevator 20. The elevator may then be raised to any floor level, and it is possible to do this while the bridge crane 12 may at the same time be moving the elevator 20 horizontally down the aisle 4 to any storage space 40 where it may be desired to unload the car.

The elevator may be of a width to receive a plurality of cars and the storage spaces 7 may extend from the aisle for the length of a plurality of cars. With this arrangement, if it is desired to obtain a first car parked outwardly from the aisle and in front of a second car parked next to the aisle, the second car could be backed onto the elevator 20; then the elevator 20 could be moved horizontally one car space so that the first car could then be backed onto the elevator adjacent the second car. After this, the elevator could be moved horizontally back to where the second car was originally backed thereon so that this car could be driven back into its original parking space.

With the structure of this invention it is not necessary to have the sides 53 of the elevator sliding in contact with any guide means affixed to the aisle sides 54, as is necessary in other parking structures. The method of pivotally suspending the guide means from the traction means itself so that the guides are carried along horizontally by the traction means does away with the difficulties previously encountered due to the variations of the transverse differences between guides on opposite sides of the aisle. When such variations were at all pronounced, an elevator which would easily pass upwardly or horizontally along one part of the aisle might bind against guides in another part of the aisle which were closer together.

With this invention a small interspace 55 may be left between elevator floor 56 and the story floors, and such space may be predetermined of such a width to compensate for any variations in aisle width which may be encountered.

It is pointed out that the conventional guard rails and car stops which could obviously be required for elevator operation have been omitted for purposes of clarity.

Although the drawings of this invention disclose a structure in which the elevator moves down an aisle centrally of parking spaces on either side thereof, this invention is also applicable to structures and to conditions where there may be only storage space on one side of the passage down which the elevator passes.

In cases where it is desired to have the vehicles enter and depart by the same paths, any well known turntable means may be incorporated with the elevator to accomplish this purpose.

The way 22 may be moved from place to place, and the building itself, together with the bridge crane and track unit, may be constructed to be easily taken down, moved, and reassembled. Also the feature by which the guides 21 are bolted to the cross channels 26 and 25 in assembly to form the yoke 30 in suspension from the bridge crane 12, results in the facile dismantlement of these elements. These features, taken together, result in a parking or storage structure which is adapted to be moved and set up in new locations, as when real estate values in the business centers of cities prohibit the further use of space therein for such purposes.

This invention is not limited to the specific traction means and elevator suspensions hereinbefore shown and described but other conventional and suitable types may be used. The elevator may be suspended from trolley hoists mounted on trolley beams supported from, and below building portions extending above the passageway down which the elevator moves horizontally. Also, the traction means may move down a top floor or roof portion and have a cantilever arm extending therefrom to support the elevator for suspension and motion down a passageway adjacent and parallel to the area down which the traction means moves.

It is also not considered that the point of yoke suspension need only be above the traction means, but pivotal suspension may be obtained therefor by supporting the yoke below the traction means, as by rods extending downwardly from traction means to yoke. In such construction, the inherent flexibility of the rods will constitute the source of yoke pivotability.

Broadly, this invention considers a parking or storage system whereby loads may be received and moved both horizontally and vertically to storage spaces from which they may later be transported both horizontally and vertically for delivery from the storage structure.

This invention also broadly considers such a system in which the elevating means in which the loads are transported is pivotally supported by the traction means therefor.

What is claimed is:

1. In a multistoried storage structure having a group of storage spaces arranged in superposed longitudinal rows, an aisle common to said spaces, a pair of longitudinal tracks transversely spaced apart at opposite sides of said aisle and above the uppermost row of storage spaces, a traveling bridge crane spanning said aisle with opposite ends riding on said spaced apart side tracks for travel along the longitudinal rows of storage spaces, a pair of dependent elevator guide rails having trunnion pin suspension connection at their upper ends with the bridging crane and centrally of the transverse dimension of said aisle and which confine relative movement between the guide rails and the bridge crane to that about an axis parallel to the longitudinal path of travel of said bridge crane, an elevator having guide connections with said vertical guide rails and being operatively suspended from the bridge crane for vertical travel between the superposed rows of storage spaces and longitudinally extending way means below the lowermost row of storage spaces and extending parallel to said path of travel of the bridge crane as a guide bearing for the lower ends of said vertical guide rails for accommodating relative longitudinal and vertical motion of said lower ends while restraining free oscillation of the guide rails about their upper trunnion pin suspension means.

2. In a multi-storied storage structure having a hatchway, transversely spaced tracks extending longitudinally in the uppermost region of the hatchway and on opposite

sides of the longitudinal center line thereof, a bridge crane spanning the hatchway and having longitudinally spaced apart supporting members on each side thereof in riding guide engagement with said spaced tracks, longitudinally spaced apart elevator guide rails extending vertically of the hatchway in the transverse central region thereof, trunnion pin connector means between said bridge crane and the upper ends of said guide rails hingedly suspending the vertical guide rails on a longitudinally extending axis for relative rocking adjustment in a direction transverse to the longitudinal extent of the hatchway, and a lower longitudinally extending way engaging the lower ends of the guide rails and restraining their oscillation away from the vertical, said suspension trunnion pin connector means operating to relieve racking

strains by the accommodation of relative transverse rocking movement of the vertical guide rails and the bridge crane without transmission of leverage forces one to the other due to misaligned relations between the longitudinally extending lower way and upper tracks.

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